

New Additions to the Moss Flora of Mindanao Island, Republic of the Philippines

James R. Shevock¹ and Aimanuelzon P. Yorong²

ABSTRACT

A couple of two month-long botanical expeditions conducted during 2014 and 2015 to inventory the moss flora of several mountain ranges in Mindanao, Philippines yielded 17 mosses reported new for the island, namely, *Chaetomitrium elmeri*, *Chaetomitrium everettii*, *Clastobryum indicum*, *Ctenidium malacobolum*, *Distichophyllum subcuspidatum*, *Distichophyllum undulatum*, *Ectropothecium zollingeri*, *Fissidens anomalus*, *Fissidens pellucidus*, *Fissidens polypodioides*, *Fissidens taxifolius*, *Hookeriopsis wishurae*, *Meiothecium tenellum*, *Rhapidostichum luzonense*, *Rhodobryum aubertii*, *Rhynchostegiella menadensis* and *Rosulabryum billardieri*. Southern range extensions for Mindanao are reported for *Acroporium sigmatodontium* and *Pelekium velatum*.

KEYWORDS: bryophyte inventory, new records, species distribution, taxonomy

INTRODUCTION

This is the 6th report of new records of Philippine mosses for the island of Mindanao obtained from two joint botanical expeditions between the Center for Biodiversity Research and Extension in Mindanao (CEBREM) of Central Mindanao University (CMUH) and the California Academy of Sciences (CAS) conducted in 2014 and 2015. Our colleague and friend, Benito C. Tan (1946-2016), was a member of the bryophyte collecting team on these Mindanao expeditions and he was instrumental in the development of the first five reports of new moss additions for Mindanao (Azuelo *et al.*, 2015, Tan & Shevock 2014, 2015, Tan *et al.*, 2015, 2017). We dedicate this paper in his memory and his life-long interest in the inventory and conservation of bryophytes of the Philippines. Figure 1 is the last photograph of Dr. Tan taken in the field during the 2015 expedition. A complete duplicate set of the moss specimens obtained during the 2014 and 2015 expeditions resides in the herbarium of CMUH and selected duplicates, especially of rare species, are provided to the Philippine National Herbarium (PNH) in Manila.



Fig. 1. Benito Tan and the authors along the summit ridge of Mt. Limbawon, Pantaron Range, 30 Jun 2015.

Within the Philippines, the number of mosses documented from Mindanao is far fewer than Luzon Island to the north (Bartram, 1939; Tan & Iwatsuki, 1991, Tan *et al.*, 2000; 2015; Linis & Tan, 2008). Since both islands are similar in size, contain many peaks exceeding 2,000 m, either within national parks or other conserved or protected landscapes, and have numerous areas with cloud forest environments, this representation of the diversity of the moss flora is in our view simply a function of historic under-collection of bryophytes in Mindanao as compared to Luzon. The moss floras of both islands overlap with common and widespread Asian species, yet Mindanao has a much greater affinity for

¹California Academy of Sciences, Department of Botany, 55 Music Concourse Drive, Golden Gate Park, San Francisco, California 94118, U.S.A.

²Center for Biodiversity Research and Extension in Mindanao (CEBREM), Central Mindanao University, Musuan, Bukidnon, 8710, Philippines

*Corresponding author: jshevock@calacademy.org

Date Submitted: 08 November 2017

Date Accepted: 14 April 2018

species with a Gondwana origin whereas Luzon has greater affinity of Laurasian taxa (Tan *et al.*, 2017). Several Philippine field workers have also added species to the moss flora of Mindanao (Linis, 2010, Lubos, 2007, 2010). With each expedition conducted in Mindanao, the number of species new for this southern island increases, and in time, we predict that the moss floras of Luzon and Mindanao will be similar in size. The previous five papers referenced above in this series added 84 mosses new for Mindanao, of which 18 species are new for the Philippines and two species are new to science. Luzon has over 200 mosses more than is currently reported from Mindanao. This report narrows that gap. While we have made great strides in identifying nearly 1,000 moss collections obtained during the two expeditions, conducting bryophyte inventory work in Mindanao offers some additional challenges compared to other parts of the country. Some portions of Mindanao currently remain unsafe to access due to civil unrest. Nonetheless, many mountain ranges, especially in the northeastern portion of the island, are readily accessible and these areas have been the focus of our recent expeditions. Each mountain range we have explored has yielded new island records. As with any inventory endeavor, we have many more collections yet to critically examine and identify to species. We anticipate future publications from time to time as new records for Mindanao are confirmed. We also have plans for future expeditions to other mountain ranges in Mindanao and adjacent islands that have not been adequately surveyed for mosses.

One of our field observations is just how different in species composition the bryophyte floras can be between nearby mountains sampled at similar elevations, forest structure and geology. We are continually impressed by the bryophyte communities we observe, and the number of species not encountered between adjacent or nearby areas. This is also reflected in new additions reported here where all but one species was obtained from a single locality or mountain range.

NEW MINDANAO MOSS RECORDS

Below, we report species recently determined to be new distribution records for Mindanao Island. Voucher specimens for these taxa are primarily deposited at CAS and CMUH with additional duplicates provided to other herbaria where applicable. Arrangement of taxa are presented in alphabetical order for ease of reference. We have added the family name in brackets at the end of each species name based on the generic arrangement in Goffinet *et al.* (2009) or supplemented by more recent molecular evidence.

Acroporium sigmatodontium (Müll. Hal.) M. Fleish.
[Sematophyllaceae]

The genus *Acroporium* is well represented in the Philippines. *Acroporium* is a large and taxonomically difficult genus of about 75 species that is commonly encountered in cloud forests throughout Malesia with 20 taxa now reported for the Philippines. It is not surprising that new Mindanao *Acroporium* additions would be documented from adjacent regions of Malesia (Tan & Shevock, 2014, Tan *et al.*, 2015). This species was earlier reported from Mt. Timpoong on Camiguin Island (Linis, 2010) at the northernmost extension of Mindanao. Our record below adds a second record for Mindanao at the southern end of the island.

Specimens examined: **Davao Oriental Province.** Hamiguitan Range Wildlife Sanctuary, at Camp 2 about 9 km by trail from the Hamiguitan Visitor Center, 920 m, 21 Jun 2015, *Shevock & Yorong 46891* (CAS, CMUH, UC).

Chaetomitrium elmeri Broth. [Symphyodontaceae]

The genus *Chaetomitrium* has 67 species although many are poorly known (Crosby *et al.*, 2000). The three areas of greatest species diversity of *Chaetomitrium* are the Philippines, Borneo, and New Guinea ((Tan & Robinson, 1990). Seventeen species of *Chaetomitrium* were reported for the Philippines (Tan & Iwatsuki, 1991). This report of *Chaetomitrium elmeri* extends the Philippine distribution from Sibuyan and Panay to Mindanao.

Specimens examined: **Davao Oriental Province.** Hamiguitan Range Wildlife Sanctuary along the 9 km trail from Visitor Center to Camp 2, mid slope of Mt. Hamiguitan, 675 m, 21 Jun 2015, *Shevock & Yorong 46876* (CAS, CMUH, UC).

Chaetomitrium everettii Mitt. *ex* Dix. [Symphyodontaceae]

Although *Chaetomitrium* has been aligned with the Hookeriaceae it has a combination of several morphological features that made it rather unique to this family (Tan & Robinson, 1990). *Chaetomitrium* is now transferred to the Symphyodontaceae (Goffinet *et al.*, 2009). A key to Philippine *Chaetomitrium* is provided in Tan & Robinson (1990). Although reported as occurring in the Philippines (Tan & Iwatsuki, 1991), no island was listed. We can now add Mindanao within the confirmed species range.

Specimens examined: **Camiguin Island Province.** Mt. Timpoong along Kantembay Trail toward summit, 1250 m, 10 Jul 2015, *Shevock & B.C. Tan 47271* (CAS, CMUH, PNH, UC).

Clastobryum indicum (Dozy & Molk.) Dozy & Molk.
[Pylaisiadelphaceae]

This species represents the third new entry for the genus *Clastobryum* in Mindanao (Tan & Shevock, 2014).

Specimens examined: **Camiguin Island Province**. Mt. Hibok-Hibok along Tibulig Trail below the rim of the caldera, 1100 m, 9 Jul 2015, *Shevock & B.C. Tan 47216* (CAS, CMUH, UC).

Ctenidium malacobolum (Müll. Hal.) Broth. [Hylocomiaceae]
Ctenidium malacobolum is a widespread Asian species reported previously for Luzon (Tan & Iwatsuki, 1991). The habitat is primarily on soil or on the base of tree trunks. Among this genus the plants of *C. malacobolum* are larger with regularly pinnate branches, strongly serrulate leaf margins, thick-walled laminal cells and a prominent alar region (Nishimura, 1985). Although traditionally placed within the Hypnaceae, *Ctenidium* is now viewed as a member of the Hylocomiaceae (Goffinet *et al.*, 2009).
Specimens examined: **Bukidnon Province**. Mt. Kitanglad Range Natural Park on trail about 4 km above Lantapan Village toward Mt. Dulang-Dulang, 1,900 m, 20 Apr 2014, *Shevock 44694* (CAS, CMUH, UC).

Distichophyllum subcuspidatum A. Nog. & Z. Iwats. [Daltoniaceae]
The genus *Distichophyllum* is highly diverse comprising over 100 recognized species with about 65 species in tropical Asia and Oceania with 14 species documented in the Philippines (Tan & Robinson, 1990). Although long considered a member of the Hookeriaceae, molecular evidence suggests it belongs in the Daltoniaceae (Goffinet *et al.*, 2009). Although most genera in this family have a double costa, *Distichophyllum* has a single, fairly prominent costa as does *Daltonia*. The previous record for *Distichophyllum subcuspidatum* for the Philippines is from Sibuyan Island although Tan & Robinson (1990) commented that this species may prove to be a synonym of *Distichophyllum brevisuspes* reported previously from Luzon.

Specimens examined: **Bukidnon Province**. Pantaron Range, Mt. Limbawon. On trail about 1.5 km below summit, 1820 m, 30 Jun 2015, *Shevock, Yorong & B.C. Tan 47033* (CAS, CMUH, UC) and about 4 km from summit, 1675 m, 1 Jul 2015, *Shevock, Yorong & B.C. Tan 47071* (CAS, CMUH, UC).

Distichophyllum undulatum Dozy & Molk. ex Bosch & Sande Lac. [Daltoniaceae]
Among the Philippine species of *Distichophyllum*, *D. undulatum* would be most likely be confused with the common *D. mitternii*. It differs from it by having an irregularly denticulate upper leaf border.

Specimens examined: **Bukidnon Province**. Pantaron Range, Mt. Limbawon. On trail about 2 km below summit, 1800 m, 30 Jun 2015, *Shevock, Yorong & B.C. Tan 47022* (CAS, CMUH, UC).

Ectropothecium zollingeri (Müll. Hal.) A. Jaeger [Hypnaceae]
Ectropothecium is a very large genus of at least 200 species although nearly two-thirds of them are poorly known (Crosby *et al.*, 2000). The genus is likely to be considerably reduced in number through synonymy once a monograph is produced incorporating both molecular and morphological data. Of the species in the genus, *E. zollingeri* is relatively well understood although it is quite variable across Asia and Oceania. The Mindanao collection was determined by B.C. Tan.

Specimens examined: **North Cotabato Province**. Mt. Apo Natural Park along Mandarangan Trail near intersection with road to Geothermal Production Field, ADC just above Mahomanoy Mountain Resort, 1350 m, 3 May 2014, *Shevock & B.C. Tan 45089* (CAS, CMUH, UC).

Fissidens anomalus Mont. [Fissidentaceae]
Fissidens anomalus is widespread throughout tropical Asia where it is primarily restricted to the trunks of hardwood trees (Eddy, 1988). This relatively large *Fissidens* species is unlikely to be confused with any other corticolous member of the genus in the Philippines. Reported from several areas in Luzon (Tan & Iwatsuki, 1991).

Specimens examined: **Bukidnon Province**. Mt. Kitanglad Range Natural Park. Upper slopes of Dulang-Dulang along main trail route to summit ridge, 2200 m, 21 Apr 2014, *Shevock 44766* (BOL, CAS, CMUH, KUN, MO, UC), 2290 m, 22 Apr 2014, *Shevock 44797* (CAS, CMUH, TNS), 2435 m, 22 Apr 2014, *Shevock 44803* (CAS, CMUH, NY) and 2380 m, 23 Apr 2014, *Shevock 44848* (CAS, CMUH).

Fissidens pellucidus Hornsch. [Fissidentaceae]
A rather widespread species and reported previously from the Philippines (Li and Iwatsuki, 2001). *Fissidens pellucidus* is a rather small lustrous species generally confined to soil. According to Pursell (2007), *F. pellucidus* often can be recognized by rust-colored stems and costa and laminal cells with guttulae although this feature could be misinterpreted as papillae so careful examination is required.

Specimens examined: **North Cotabato Province**. Mt. Apo Natural Park along Mandarangan Trail near intersection with road to Geothermal Production Field, ADC just above Mahomanoy Mountain Resort, 1350 m, 3 May 2014, *Shevock & B.C. Tan 45102* (CAS, CMUH, UC).

Fissidens polypodioides Hedw. [Fissidentaceae]
Fissidens polypodioides is a rather large species ranging up to 70 mm high with a coarsely serrate leaf apex. It is a widespread ranging species. Bartram (1939) considered *F. areolatus* from Luzon to be a likely synonym of *F.*

polypodioides. Tan & Iwatsuki (1991) maintained *F. areolatus* in their checklist but it has since been placed in synonymy by Li & Iwatsuki (2001).

Specimens examined: **Bukidnon Province**. Mt. Kitanglad Range Natural Park. Upper slopes of Dulang-Dulang along main trail route to summit ridge, 2495 m, 22 Apr 2014, *Shevock 44804* (CAS, CMUH, UC).

Fissidens taxifolius Hedw. [Fissidentaceae]

Fissidens taxifolius is widely distributed on multiple continents. It is reported previously from Luzon (Tan & Iwatsuki, 1991). The highly mammillose laminal cells is a key feature of this species among Philippine *Fissidens* species.

Specimens examined: **North Cotabato Province**. Mt. Apo Natural Park, slopes above Geothermal Production Field, 2020 m, 30 Apr 2014, *Shevock 44976* (CAS, CMUH, UC).

Hookeriopsis wishuræ M. Fleisch. [Pilotrichaceae]

Although *Hookeriopsis wishuræ* is similar to *H. unacamundiana* (Tan & Robinson, 1990), the leaf apices are long and acuminate. This appears to be the second report of *H. wishuræ* for the Philippines. The other locality is Mt. Talinis, Negros Island (Tan & Iwatsuki, 1983, 1991, Tan & Robinson, 1990).

Specimens examined: **Bukidnon Province**. Pantaron Range, Mt. Limbawon. On trail about 1.5 km below summit, 1820 m, 30 Jun 2015, *Shevock, Yorong & B.C. Tan 47033* (CAS, CMUH, UC) and about 4 km from summit, 1690 m, 1 Jul 2015, *Shevock, Yorong & B.C. Tan 47085a* (CAS, CMUH).

Meiothecium tenellum Broth. & Paris [Sematophyllaceae]

Meiothecium is a genus of about 30 species; however, many are poorly known (Crosby *et al.*, 2000). Within Malesia seven species are documented and *M. tenellum* appears most like a miniature *M. microcarpum* (Tan *et al.*, 2011) which was also reported from Mindanao (Tan & Iwatsuki, 1991). This species seems to be encountered often in areas impacted by man either in forest openings or in areas with landscaped trees.

Specimens examined: **Bukidnon Province**. Campus of Central Mindanao University, 320 m, 5 Jul 2015, *Shevock 47109* (CAS, CMUH).

Pelekium velatum Mitt. [Thuidiaceae]

This collection represents the second occurrence of *Pelekium velatum* for Mindanao. The earlier report was from Mt. Hibok-Hibok, Camiguin Island (Linis, 2010), an occurrence that we also confirmed based on our 2014 collections. Our collection reported here is from the southern end of the island.

Specimens examined: **Davao Oriental Province**. Hamiguitan Range Wildlife Sanctuary, along 9 km by trail from the Hamiguitan Visitor Center, 550 m, 23 Jun 2015, *Shevock & Yorong 46863* (CAS, CMUH, UC).

Rhapidostichum luzonense (Broth.) Broth.

[Sematophyllaceae]

This genus as currently envisioned (Tan *et al.*, 2011) contains 11 species centered in distribution in New Guinea and surrounding islands. The alternate circumscription is to view this moss as a variety of *R. piliferum* (Tan *et al.*, 2011).

Specimens examined: **Davao Oriental Province**. Hamiguitan Range Wildlife Sanctuary, at Camp 2 about 9 km by trail from the Hamiguitan Visitor Center, 960 m, 23 Jun 2015, *Shevock & Yorong 46933* (CAS, CMUH, FH, PNH, UC) and *46928* (CAS, CMUH).

Rhodobryum aubertii (Schwägr.) Thér. [Bryaceae]

The genus *Rhodobryum* with 34 recognized species is basically well known (Crosby *et al.*, 2000). Two species are reported for the Philippines. *Rhodobryum aubertii* can be readily distinguished from *R. giganteum* by having teeth of leaf margins single versus double. It generally is also a smaller plant than *R. giganteum*.

Specimens examined: **Bukidnon Province**. Pantaron Range, Mt. Limbawon. On trail about 2 km above Kibalabag Village, 1365 m, 29 Jun 2015, *Shevock, Yorong & B.C. Tan 46990* (CAS, CMUH, UC).

Rhynchostegiella menadensis (Sande Lac.) E.B. Bartram

[Brachytheciaceae]

The genus *Rhynchostegiella* has a long and convoluted history of taxa assigned to it and then subsequently moved elsewhere. In addition, many of the 84 species recognized in this genus are poorly known (Crosby *et al.*, 2000). Four species of *Rhynchostegiella* are reported from the Philippines (Tan & Iwatsuki, 1991) but this is the first report for this genus occurring in Mindanao.

Specimens examined: **Camiguin Island Province**. Mt. Hibok-Hibok along Tibulig Trail below the caldera, 790 m, 9 Jul 2015, *Shevock & B.C. Tan 47193* (CAS, CMUH, UC).

Rosulabryum billarderii (Schwägr.) J.R. Spence [Bryaceae]

Rosulabryum was not established until 1996 as so many moss floras retained this segregate within the large genus *Bryum*. The spelling of the species name appears in various iterations in the literature based on the Latinized form of Billardi re, however, it is now to be standardized simply as '*billarderii*'. This is a rather widespread species reported

from several Luzon stations (Tan & Iwatsuki, 1991). *Rosulabryum billardieri* is pantropical so it would be expected to also occur in Mindanao.

Specimens examined: **Bukidnon Province**. Mt. Kitanglad Range Natural Park. Upper slopes of Dulang-Dulang along main trail route to summit ridge, 2495 m, 22 Apr 2014, *Shevock 44807* (CAS, CMUH); **North Cotabato Province**. Mt. Apo Natural Park, slopes above Geothermal Production Field, 2020 m, 30 Apr 2014, *Shevock 44990* (CAS, CMUH).

CONCLUSION

During these two month-long expeditions to Mindanao, we have cumulatively added over 100 mosses as new records for the Mindanao moss flora (Azuelo *et al.*, 2015, Tan & Shevock, 2014, 2015, Tan *et al.*, 2015, 2017). This represents nearly a 30 percent increase to the island moss flora and greatly alters the distribution of species reported from Mindanao (Tan & Iwatsuki, 1991). Clearly additional exploration and the acquisition of high-quality museum specimens are warranted including review of recent collections placed at PNH by other Philippine bryologists. We predict that many more bryophyte species remain to be discovered through inventory activities to other less sampled mountain ranges across Mindanao Island.

ACKNOWLEDGEMENT

We thank Prof. Victor Amoroso and Mr. Fulgent Coritico at the CEBREM office of Central Mindanao University for field support, permit acquisition, and logistics during the 2014-2015 Mindanao expeditions. Funding for the second author during the 2015 expedition was provided through the California Academy of Sciences Bryophyte Expedition Fund. We also thank the indigenous peoples who live in the forests and have a vested interest in their long-term conservation by providing us permission to explore and make herbarium vouchers. In addition, local guides ensured our safety and provided porter services to reach isolated campsites higher up into the mountains.

LITERATURE CITED

Azuelo, A.G., Tan, B.C., Shevock, J.R., Manual, A., Yorong, A., and Sariana, L.G. 2015. Mosses new for the Mindanao Island, Republic of the Philippines. *Proceedings of the California Academy of Sciences, Series 4*, 62(4): 127-134, 2 figs.
 Bartram, E.B. 1939. Mosses of the Philippines. *Philippine Journal of Science*, 68: 1-437.
 Crosby, M.R., Magill, R.E., and He, S. 2000. *A checklist of the mosses*. Missouri Botanical Garden, St. Louis.

Eddy, A. 1988. A handbook of Malesian mosses. Vol. 1. Sphagnales to Dicranales. British Museum (Natural History), London.
 Goffinet, B., Buck, W.R., and Shaw, A.J. 2009. Morphology, anatomy, and classification of the Bryophyta. Pages 55-138 *in*: Goffinet, B. and Shaw, A.J. (eds.) *Bryophyte Biology*. Second edition. Cambridge University Press, New York.
 Li, Z.-H. and Iwatsuki, Z. 2001. Fissidentaceae. Pages 3-67 *in*: He, S. (project coordinator), *Moss Flora of China, English version*. Volume 2. Fissidentaceae–Ptychomitriaceae. Science Press, Beijing and Missouri Botanical Garden, St. Louis.
 Linis, V.C. 2010. The moss flora of Camiguin Island, Philippines and their floristic relations to some adjacent islands in the archipelago. *Telopea*, 12(4): 525-542.
 Linis, V.C. and Tan, B.C. 2008. Progress of studies on phytogeography and biodiversity of Philippine moss flora from 1991 to 2006. Pages 13-22 *in* Mohamed, H., Baki, B.B., Nasrulhaq-Boyce, A., and Lee, P.K.Y., eds., *Bryology in the new Millennium*. University of Malaya, Kuala Lumpur.
 Lubos, L.C. 2007. New records of Philippine mosses from Mindanao Island. *Liceo Journal of Higher Education and Research*, 5(2): 1-8.
 Lubos, L.C. 2010. Species richness, distribution and status of mosses in selected mountains in Mindanao, Philippines. *Asian Journal of Biodiversity*, 1(1): 63-82.
 Nishimura, N. 1985. A revision of the genus *Ctenidium* (Musci). *Journal of the Hattori Botanical Laboratory* 58: 1-82.
 Pursell, R.A. 2007. Fissidentaceae. *Flora Neotropica Monograph* 101: 1-278. New York Botanical Garden, Bronx, New York.
 Tan, B.C. and Iwatsuki, Z. 1983. Nineteen new records of Philippine mosses. *Kalikasan, Philippine Journal of Biology*, 12: 328-350.
 Tan, B.C. and Iwatsuki, Z. 1991. A new annotated Philippine moss checklist. *Harvard Papers in Botany*, 3: 1-64.
 Tan, B.C., Koponen, T., and Norris, D.H. 2011. Bryophyte flora of the Huon Peninsula. Papua New Guinea. LXXIII. Sematophyllaceae (Musci) 2. *Brotherella*, *Clastobryum*, *Clastobryopsis*, *Heterophyllum*, *Isocradiella*, *Isocradiellopsis*, *Meiotheciella*, *Meiothecium*, *Papillidiopsis*, *Rhaphidostichum* and *Wikia*. *Acta Bryolichenologica Asiatica*, 4: 3-58.
 Tan, B.C., Lubos, L., and Schwarz, U. 2000. New and biogeographically noteworthy records of Philippine mosses from Mindanao Island. *Tropical Bryology*, 18: 27-37.
 Tan, B.C. and Robinson, H. 1990. A review of Philippine Hookeriaceae taxa. *Smithsonian Contributions in Botany*, 75: 1-41.

- Tan, B.C. and Shevock, J.R. 2014. Noteworthy mosses and a new variety collected from the 2014 joint expedition of CAS and CMUH new to Mindanao Island of the Philippines. *Bryophyte Diversity and Evolution*, 36(1): 22-30.
- Tan, B.C. and Shevock, J.R. 2015. Species of *Macromitrium* (Orthotrichaceae) new to the Mindanao Region and the Philippines with one species new to science. *Proceedings of the California Academy of Sciences, Series 4*, 62(3): 539-547, 3 figs., Appendix.
- Tan, B.C., Shevock, J.R., Azuelo, A.G., and Lubos, L. 2017. Additions to the moss floras of Mindanao and the Philippines with a focus on the rediscovery of *Euptychium setigerum*. *Natural History Bulletin of the Siam Society*, 62 (1): 15-20.
- Tan, B.C., Shevock, J.R., Coritico, F., and Amoroso, V. 2015. Mosses new for Mindanao Island, The Philippines, III. 2015. *Bulletin of the National Museum of Science, Series B*, 41(3): 91-97.